THAT WHICH IS CLAIMED IS:

1. A process for producing sulfuric acid comprising:

contacting an aqueous solution with a sulfur material in the form of a pile wherein said sulfur material is selected from the group consisting of elemental sulfur, sulfur-containing ores, sulfide-containing ores, sulfur-containing minerals, sulfide-containing minerals and combinations thereof and wherein said pile additionally contains acidophilic microbes;

aerating the pile with an oxygen-containing gas;

withdrawing a liquid stream from said pile;

returning a first portion of said liquid stream to said pile for further contacting with said pile; and

taking a second portion of said liquid stream as an acid product.

2. The process of claim 1 wherein said sulfur material is elemental sulfur and is in a form selected from the group consisting of prills, pastilles, slates, dusts, powders, crystals and combinations thereof.

3. The process of claim 2 wherein said elemental sulfur is selected from the group consisting of prills, pastilles, slates and combinations thereof.

4. The process of claim 3 wherein said pile further comprises a packing material.

5. The process of claim 4 wherein said packing material is selected from the group consisting of sulfur-containing ores, sulfide-containing ores, sulfur-containing minerals, sulfide-containing minerals and combinations thereof.

6. The process of claim 5 wherein said packing material comprises between about 25% and about 75% of said pile by weight.

7. The process of claim 5 wherein said packing material comprises from 30% to 60% of the pile by weight.

8. The process of claim 5 wherein said packing material comprises from 40% to 50% of said pile by weight.

9. The method of claim 4 wherein said packing material is selected from the group consisting of crushed glass, glass beads, polymer beads, polymer chips and polymer substrates.

10. The method of claim 9 wherein said sulfur material is agglomerated onto the packing material.

11. The method of claim 9 wherein the sulfur material is coated onto the packing material.

12. The method of claim 1 further comprising increasing the concentration of sulfuric acid in said acid product through at least one additional process step.

13. The method of claim 12 wherein said additional further process step is selected from the group consisting of reverse osmosis, membrane separation, filtration, distillation, and cryogenic methodology.

14. The method of claim 1 wherein said aqueous solution is introduced into said pile at a rate between about 0.5 and about 40.0 l/min/m^2.

15. The method of claim 12 wherein said a aqueous solution is introduced into said pile at a rate between 2.0 and 21.0 l/min/m^2.

16. The method of claim 1 wherein said aqueous solution is contacted with said sulfur material by trickling said solution on the top of said pile and allowing said aqueous solution to flow down and through said pile.

17. A process for producing sulfuric acid comprising:

contacting an aqueous solution with elemental sulfur contained in a reaction vessel by trickling said aqueous solution on the top of said pile at a rate between 2.0 and 21.0 l/min/m^2 and allowing said aqueous solution to flow down and through said elemental sulfur wherein said elemental sulfur is selected from prills, pastilles, slates and combinations thereof and wherein said reaction vessel additionally contains acidophilic microbes and a packing material wherein said packing material makes up from 30% to 60% of the reaction vessel contents by weight;

aerating the pile with an oxygen-containing gas;

withdrawing a liquid stream from said pile;

returning a first portion of said liquid stream to said pile for further contacting with said pile;

taking a second portion of said liquid stream as an acid product; and

increasing the concentration of sulfuric acid in said acid product through at least one additional process step selected from the group consisting of reverse osmosis, membrane separation, filtration, distillation, and cryogenic methodology.

18. The method of claim 17 wherein said packing material is selected from the group consisting of sulfur-containing ores, sulfide-containing ores, sulfur-containing minerals, sulfide-containing minerals and combinations thereof.

19. The method of claim 17 wherein said elemental sulfur is agglomerated onto the packing material.

20. The method of claim 18 wherein said elemental sulfur material is coated onto the packing material.

21. An apparatus for producing sulfuric acid comprising:

at least one reaction vessel having a base, said reaction vessel containing a bottom layer located adjacent to said base comprising a first

packing material and a reactant layer above said bottom layer wherein said reactant layer contains a sulfur material, selected from the group consisting of elemental sulfur, sulfur-containing ores, sulfide-containing ores, sulfur-containing minerals, sulfide-containing minerals and combinations thereof, and acidophilic microbes;

an aerator extending at least partially into said bottom layer, said aerator introducing an oxygen-containing gas into said bottom layer such that said oxygen-containing gas flows upward and through said reactant layer;

an irrigation system extending at least partially over said reactant layer, said irrigation system introducing an aqueous solution at or above the top of said reactant layer such that said aqueous solution flows down and through said reactant layer and into said bottom layer to produce an acid solution containing sulfuric acid;

means for withdrawing said acid solution from said reaction vessel to produce a withdrawn acid solution; and

means for introducing a first portion of said withdrawn acid solution to the top of said reactant layer.

22. The apparatus of claim 21 further comprising an acid concentrator which receives a second portion of said withdrawn acid solution

and increases the concentration of sulfuric acid contained in said withdrawn acid solution.

23. The apparatus of claim 21 wherein said reactant layer further comprises a second packing material.

24. The apparatus of claim 23 wherein said first packing material and said second packing material are selected from the group consisting of crushed glass, glass beads, polymer beads, polymer chips and polymer substrates.

25. The apparatus of claim 23 wherein said first packing material and said second packing material are selected from the group consisting of sulfur-containing ores, sulfide-containing ores, sulfur-containing minerals, sulfide-containing minerals and combinations thereof.

26. The apparatus of claim 21 wherein said first portion of said withdrawn acid solution is introduced to the top of said reactant layer by said irrigation system.

27. The apparatus of claim 21 wherein said reactant layer further comprises a second packing material and wherein said first packing material and said second packing material are selected from the group consisting of crushed glass, glass beads, polymer beads, polymer chips and polymer substrates, wherein said first portion of said withdrawn acid solution is introduced to the

top of said reactant layer by said irrigation system; and further comprising an acid concentrator which receives a second portion of said withdrawn acid solution and increases the concentration of sulfuric acid contained in said withdrawn acid solution.

28. The apparatus of claim 21 wherein said reactant layer further comprises a second packing material and wherein said first packing material and said second packing material are selected from the group consisting of sulfur-containing ores, sulfide-containing ores, sulfur-containing minerals, sulfide-containing minerals and combinations thereof, wherein said first portion of said withdrawn acid solution is introduced to the top of said reactant layer by said irrigation system; and further comprising an acid concentrator which receives a second portion of said withdrawn acid solution and increases the concentration of sulfuric acid contained in said withdrawn acid solution.

29. The apparatus of claim 21 wherein said apparatus comprises at least a first reaction vessel and second reaction vessel and said reactions vessels are connected in series so that said first portion of said withdrawn acid solution from said first reaction vessel is introduced to the top of said reactant layer of said second reaction vessel.

30. The apparatus of claim 29 wherein said first portion of said withdrawn acid solution is introduced to the top of said reactant layer by said irrigation system.

31. The apparatus of claim 30 further comprising an acid concentrator which receives a second portion of said withdrawn acid solution and increases the concentration of sulfuric acid contained in said withdrawn acid solution.

32. The apparatus of claim 31 wherein said reactant layer further comprises a second packing material and wherein said first packing material and said second packing material are selected from the group consisting of crushed glass, glass beads, polymer beads, polymer chips and polymer substrates.

33. The apparatus of claim 31 wherein said reactant layer further comprises a second packing material and wherein said first packing material and said second packing material are selected from the group consisting of sulfur-containing ores, sulfide-containing ores, sulfur-containing minerals, sulfide-containing minerals and combinations thereof.